Name: MARKING SCHEME ..... Adm No: .....

School: ..... Class: .....

232/2
PHYSICS
PAPER 2
JUNE-2022
TIME: 2 HOURS

SUKELLEMO -2022

Kenya Certificate of Secondary Education (K.C.S.E.)

INSTRUCTIONS TO THE CANDIDATES:

- Write your **name** and **index number** in the spaces provided above
- This paper consists of **two** sections **A** and **B.**
- Answer **all** questions in section **A** and **B** in the spaces provided.
- All working **must** be clearly shown in the spaces provided.
- Mathematical tables and electronic calculators may be used.

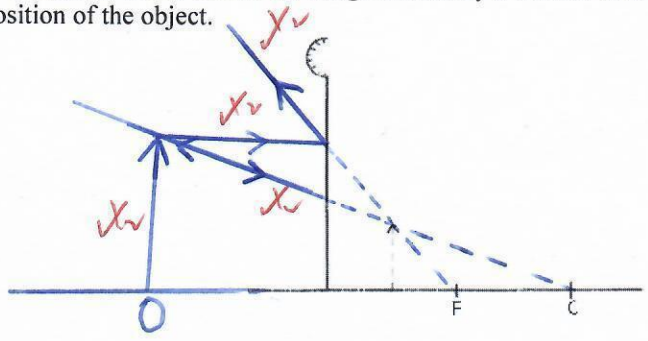
For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 12	25	
B	13	10	
	14	08	
	15	13	
	16	12	
	17	12	
TOTAL		80	

This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions is missing

SECTION A (25 MARKS)

1. The diagram below shows the image formed by a convex mirror. Complete the diagram to show the position of the object. (2mks)



2. Explain why sound cannot be heard from far when one shouts in a forest. (1mk)

Tree absorb sound ✓1

3. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

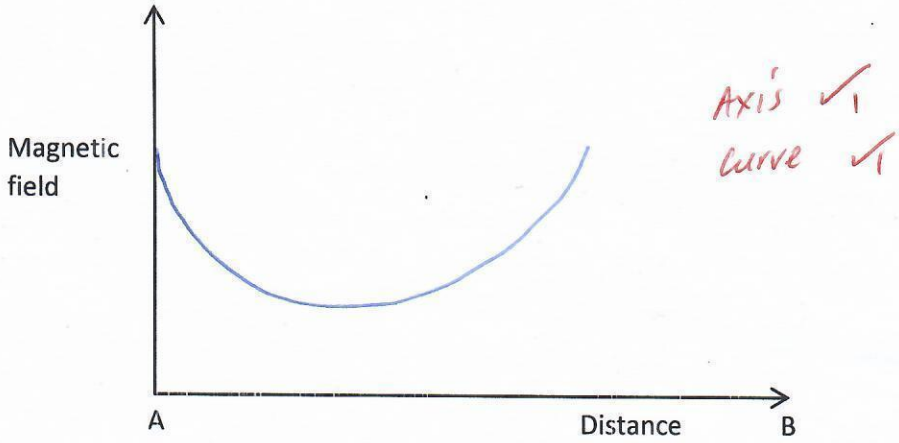
Radio	A	Visible	Ultra-violet	X-Rays	Gamma rays

Name the radiation represented by **A**. (1mk)

Microwaves ✓1

4. The figure below shows a magnet. Point **A** and **B** are in front of the magnet.

On the axes provided, sketch a graph showing how the magnetic field strength changes from A to B. (2mks)



Axis ✓1
curve ✓1

Graph should not touch the horizontal axis.

5. (a)Machines at a textile industry experiences electrostatic forces at certain points. Suggest a method that can be used to reduce these forces. (1mk)

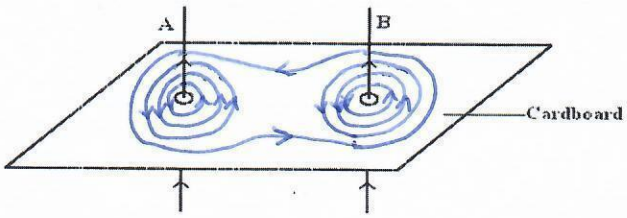
- The metal part ✓1 of the machine should be earthed to neutralized any unbalanced charges developed

(b) A sharp point of a pin is held over a positively charged electroscope. State and explain the observation made on the electroscope. (2mks)

The leaf collapses. ✓1

The electrons flows from the ground and discharges at the sharp point. ✓1

6. The figure below shows two conducting wires A and B passing through a horizontal piece of cardboard.



correct direction ✓1

(i) Sketch the resultant magnetic field patterns when the currents of high magnitude are flowing on both wires as shown. (1mk)

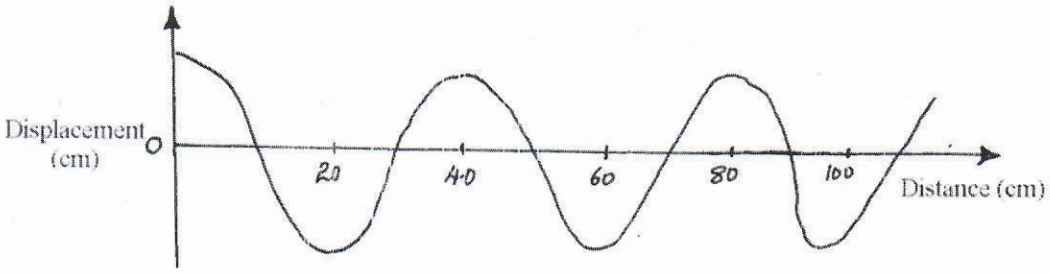
(ii) **What** is the resulting effect of the field on the wires at the loose ends? (1mk)

Wires attract each other. ✓1

(iii) If the current in B were to be reversed, **state how** resulting would affect the wire conductors. (1mk)

Wire would repel each other. ✓1

7. The figure shows a wave traveling along a medium.



Determine the speed of the wave if the source produces 480 vibrations per minute. (3mks)

Wavelength = 40cm = 0.4 ✓1
Frequency = $\frac{480}{60}$ = 8Hz ✓1
Speed = $f\lambda$
= 0.4 × 8 = 3.2m/s ✓1

Alternate
Reading wavelength = (1mk)
Finding frequency = (1mk)

8. State two things that determines the carrying capacity of an accumulator. (2mks)

- The surface area of the plates.
- Number of plates.

9. Explain why when the pinhole of a pinhole camera is enlarged, a brighter but very blurred image is seen on the screen (2mks)

- The additional brightness of the resultant image is due to light which gets into the camera through the enlarged hole. ✓1
- The image is blurred due to overlapping of different images falling on the same spot. ✓1

10. Calculate the operating current of a heating element rated 3kW, 240 Volts. (3mks)

Power; $P = VI$ ✓1
$I = \frac{P}{V} = \frac{3000}{240}$ ✓1
= 12.5A. ✓1

11. State two factors affecting resistance of a resistor. (2mks)

Length of conductor. ✓1
Cross sectional area of the conductor ✓1 Any 2
Temperature ✓1

12. Distinguish between an amplitude and wavelength of a wave. (1mk)

Amplitude is the maximum displacement of a particle of the medium by the wave while wavelength is the distance between two consecutive particles in phase or distance between two successful crests or troughs.

SECTION B

13. (a)A lens forms an image four times the size of the object on the screen. The distance between the object and the screen is 60cm when the image is sharply focused.

(i) State with a reason what type of lens was used. (2mks)

Convex (Converging) lens; Image formed is real; ✓1
A Concave (diverging) lens does not form real images ✓1

(ii) Determine:

(I) The object distance. (2mks)

$m = v/u$

$4 = v/u$

$4u = v$; $u + v = 60\,cm$.

$4u + u = 60\,cm$ ✓1

$\frac{5u}{5} = \frac{60}{5}$

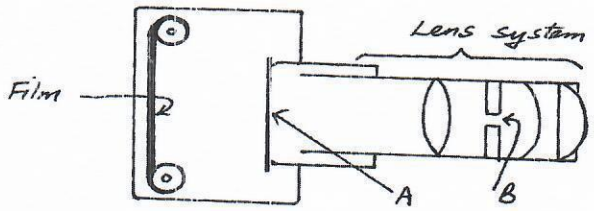
$u = 12\,cm$ ✓1 Object distance.

(II) The image distance. (2mks)

$v = 4u = 4 \times 12$ ✓1 $= 48\,cm$. ✓1

Or $= v = (60 - 12)\,cm = 48\,cm$.

b) The figure below shows the basic parts of a simple lens camera.



(i) Name the parts labeled **A** and **B**. (2mks)

A: Shutter. ✓1

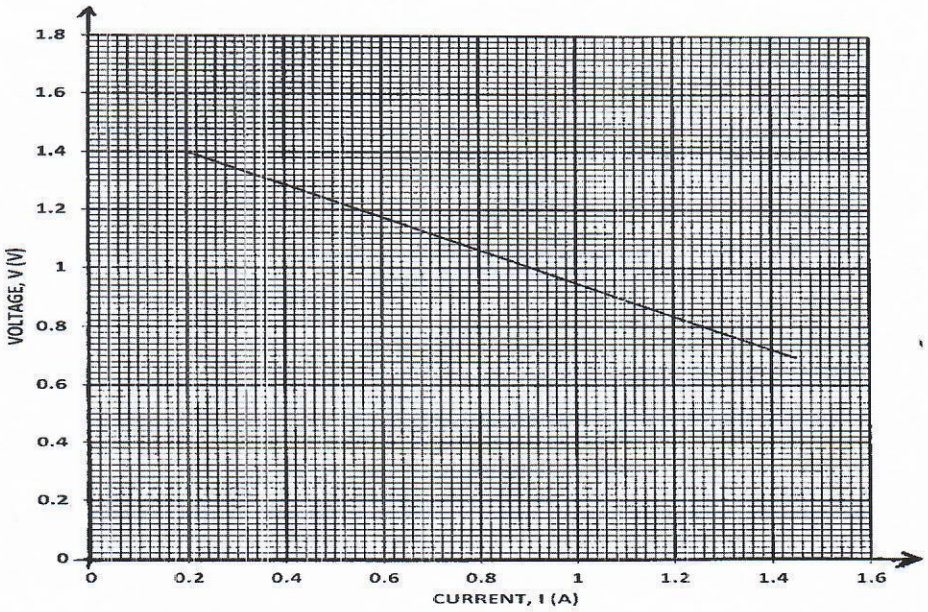
B: Diaphragm. ✓1

(ii) State the function of each of the parts **A** and **B**. (2mks)

A (Shutter) – Allows light to reach the film for a precise period of time ✓1 when the camera is in operation.

B (Diaphragm) – Controls / regulates the amount of light entering the camera. ✓1

14. The graph below shows the variation of p.d (V) across the terminals of a cell and the current drawn from the cell.



a) Use the graph to determine:

(i) The electromotive force (e.m.f) E of the cell. (1mk)

e.m.f. $E = (1.4 + \frac{6}{10} \times 0.2)$ Volts.

$= 1.52$ Volts; graph line must be produced to cut the voltage axis. ✓1

(ii) The internal resistance r, of the cell given that E = V + Ir. (3mks)

Internal resistance

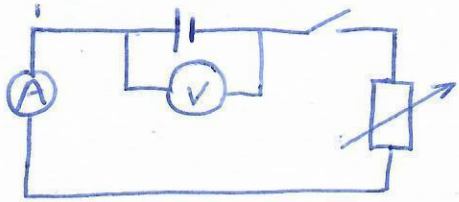
$r = \frac{\Delta V}{\Delta I}$ ✓1

$= \frac{(1.4 - 0.8)}{(0.2 - 1.26)}$ ✓1

$= \frac{0.6}{1.06}$

$r = 0.5752$. ✓1

(b) Draw a circuit diagram that may be used to obtain the values plotted in the graph. (2mks)



✓2

(c) Describe briefly how the circuit you have drawn may be used to carry out the experiment to obtain the values in the graph. (2mks)

With the switch closed, adjust the rheostat so that current is at its minimum. Increase ✓1 the current in steps using / adjusting the rheostat and for each current I note and record the corresponding value of p.d (V) across the cell. ✓1

15. (a) State Snell's law. (1mk)

The ratio of the sine of angle of incidence to the sine of the angle of refraction is constant. ✓1

(b) A coin is placed beneath a transparent block of thickness 10cm and refractive index 1.56. Calculate the vertical displacement of the coin. (3mks)

$P = \frac{\text{Real depth}}{\text{Apparent depth}}$

$1.56 = \frac{10}{x}$ ✓1

$\frac{1.56x}{1.56} = \frac{10}{1.56}$

$x = 6.410$ ✓1

Vertical displacement $= 10 - 6.410$

$= 3.59\text{cm}$ ✓1

(c) The speed of green light in a prism is 1.94×10^8m/s.

(i) Determine the refractive index of the prism material. (Speed of light in air = 3.0×10^8m/s). (2mks)

$n = \frac{\text{velocity of light in vacuum}}{\text{velocity of light in medium}}$

$= \frac{3.0 \times 10^8}{1.94 \times 10^8}$ ✓1 $n = 1.546$ ✓1

(ii) Determine the critical angle of the prism material. (2mks)

$\frac{1}{\sin C} = 1.546$

$\sin C = \frac{1}{1.546}$ ✓1

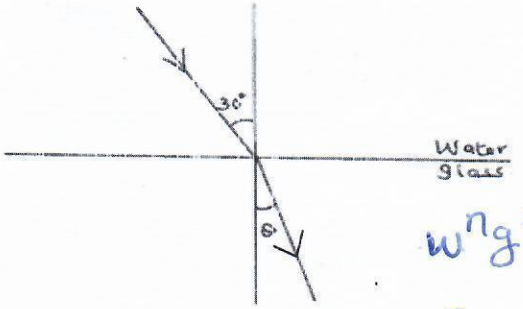
$C = 40.30°$ ✓1

(d) State **two** advantages of using optical fibre in communication. (2mks)

- Minimal energy losses due to total internal reflection ✓1
- Large quantity of data can be converted per second or unit time. ✓1
- Its flexible. ✓1

Any 2.

(e) The refractive indices of water and glass are $^3/_2$ and $^4/_3$ respectively. Find the value θ in the figure below. (3mks)



$w^n g = w^n a \quad a^n g = \frac{3}{2} \times \frac{4}{3} = \frac{8}{9}$ ✓1

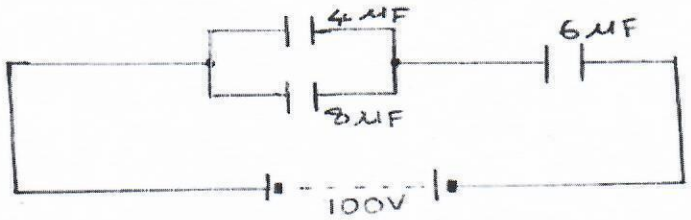
$\frac{\sin i}{\sin r} = \frac{8}{9}$

$\sin r = \frac{\sin i \times 9}{8}$ ✓1

$= \frac{0.5 \times 9}{8} = 0.56$

$r = 34.2°$ ✓1

16. The figure shows a system of capacitors connected to 100V supply.



a) Determine:

i) The effective capacitance of the circuit. (3mks)

$C_{parallel} = 4 + 8 = 12\mu F$. ✓1

$\frac{1}{C_T} = \frac{1}{12} + \frac{1}{6} = \frac{3}{12}$. ✓1

$C_T = \frac{12}{3} = 4\mu F$ ✓1

ii) The charge through the 6 μF capacitor. (3mks)

$Q = C_T V$ ✓1

$= 4 \times 100$ ✓1

$= 400\ \mu C$ OR $4 \times 10^{-4} C$. ✓1

iii) The p.d. across the 8 μF capacitor. (4mks)

P.d. across 6μF capacitor, $V_1 = \frac{Q}{C} = \frac{400}{6}$ ✓1 $= 66.67V$. ✓1

Pd across 8μF capacitor $= 100 - 66.67$ ✓1 $= 33.33V$ ✓1

b) State **two** factors that affect the capacitance of a parallel plate capacitor. (2mks)

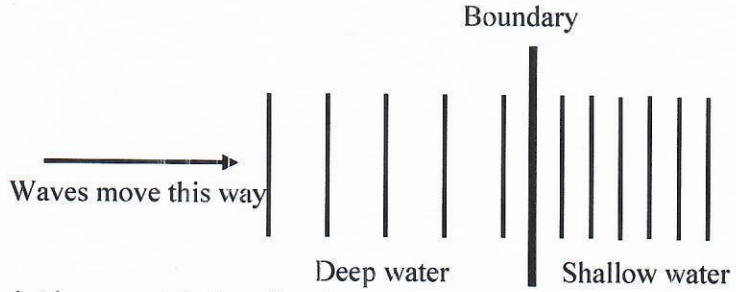
Area of overlap. ✓1

Distance between plates. ✓1

Type of dielectric between the plates. ✓1

Any 2

17. Some plane water waves were produced in a ripple tank. They pass from a region of deep water into a region of shallow water. The figure shows what the waves look like from above.



(a) State what happens at the boundary to:

(i) The frequency of the waves. (1mk)

Frequency not affected. ✓1

(ii) The speed of the waves (1mk)

Speed reduces. ✓1

(iii) The wavelength of the waves (1mk)

Wavelength reduces. ✓1

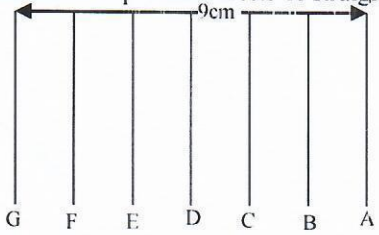
(b) The waves have a speed of 0.12 m/s in the deep water. Wave crests are 0.08m apart in the deep water. Calculate the frequency of the source producing the waves. (2mks)

$f = \frac{v}{\lambda} = \frac{0.12}{0.08} = 1.5\,Hz$ ✓1 ✓1

(c) State one difference between a stationary wave and a progressive wave. (1mk)

	Stationary wave	Progressive wave. ✓any 1
1.	No energy is transferred from source.	Energy is transferred from source.
2.	Wave form does not appear to move.	Wave form moves away continuously ✓1

(d) The figure below represents crests of straight waves produced in a ripple tank.

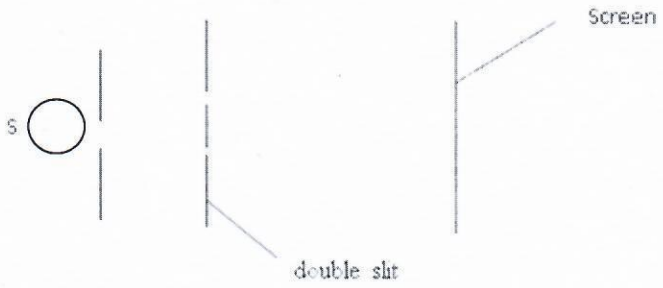


Determine the wavelength of the waves. (2mks)

$\lambda = \frac{9}{6}$ ✓1

$= 1.5\,cm$ ✓1

(e) In an experiment to observe interference of light waves, a double slit is placed close to the source S of light as shown in the figure below.



(i) State the function of the double slit. 1mk)

The two slits S1 and S2 act as coherent sources of light each diffracting the light wave that is incident.

(ii) Describe what is observed on the screen. (2mks)

Alternating bright and dark fringes are observed. Bright fringes are observed at point of constructive interference and dark fringes at points of destructive interference.

(iii) State what is observed on the screen when the slit separation is reduced. (1mk)

The distance between the bright fringes increases.